

Claims:

1. A method of forming a vapor deposited film of a metal oxide on the surface of a substrate by holding the substrate to be treated in a plasma-treating chamber, and effecting the treatment with a chemical plasma by feeding at least an organometal compound gas and an oxidizing gas into said treating chamber, wherein a method of forming a chemical vapor deposited film based on a plasma CVD method is characterized in that the rate of feeding the oxidizing gas is varied while maintaining constant the rate of feeding the organometal compound gas into the plasma-treating chamber during the formation of the vapor deposited film.

2. A method of forming a chemical vapor deposited film based on a plasma CVD method according to claim 1, wherein the rate of feeding the oxidizing gas is increased, or is increased and is, then, decreased during the formation of the vapor deposited film.

3. A method of forming a chemical vapor deposited film based on a plasma CVD method according to claim 1, wherein an organosilicon compound is used as the organometal compound gas.

4. A method of forming a chemical vapor deposited film based on a plasma CVD method according to claim 3, wherein there are conducted a pre-vacuum evaporation for feeding only the organosilicon compound gas into the plasma-treating chamber and, thereafter, a main vacuum evaporation for feeding the organosilicon compound gas together with the oxidizing gas into the plasma-treating chamber.

5. A method of forming a chemical vapor deposited film based on a plasma CVD method according

to claim 1, wherein a glow discharge for the treatment with a chemical plasma is established in a microwave electric field or in a high-frequency electric field.

5 6. A method of forming a chemical vapor deposited film based on a plasma CVD method according to claim 4, wherein the treatment with a chemical plasma in the step of main vacuum evaporation is conducted by varying the glow discharge from a low output region through up to a high output region.

10 7. A method of forming a chemical vapor deposited film based on a plasma CVD method according to claim 3, wherein, after the main vacuum evaporation, an after-vacuum evaporation is conducted to effect the vacuum evaporation by decreasing or
15 discontinuing the supply of the oxidizing gas into the plasma-treating chamber and, thereafter, the organosilicon compound is fed at a constant rate.

8. A method of forming a chemical vapor deposited film based on a plasma CVD method according
20 to claim 1, wherein said substrate is a plastic container.

9. A vapor deposited film formed on the surface of a substrate based on a plasma CVD method by using an organometal compound gas and an oxidizing gas as
25 reaction gases; wherein

said vapor deposited film has a barrier layer region positioned on the side of the substrate and an outer surface protection layer region positioned on the surface of said barrier layer region; and

30 on the basis of three elements of a metal element (M) stemming from said organometal compound, oxygen (O) and carbon (C), said barrier layer region has an (M + O) concentration which is higher than that of the outer surface protection layer region, the (M + O)
35 concentration is substantially continuously varying in

an interfacial portion between said barrier layer region and the outer surface protection layer region, and said outer surface protection layer region has a (C) concentration of not lower than 15 element %.

5 10. A vapor deposited film according to claim 9, wherein the element ratio (M/O) in said barrier layer region is in a range of 1.8 to 2.4.

10 11. A vapor deposited film according to claim 9, wherein between said barrier layer region and the substrate surface, there is an adhesive layer region having an (M + O) concentration lower than that of the barrier layer region and having a (C) concentration of not lower than 20 element %.

15 12. A vapor deposited film according to claim 9, wherein said organometal compound is an organosilicon compound, and the metal (M) is silicon (Si).

13. A vapor deposited film according to claim 9, wherein said substrate is a plastic.

20 14. A plastic bottle wherein a vapor deposited film of claim 9 is formed on the inner surface thereof.

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